

Draft ACTION PLAN B
For consideration by EBMWG at August 10, 2004 meeting

Overview

The U.S. Commission on Ocean Policy offers the following definition of ecosystem-based management:

“Ecosystem-based management looks at all the links among living and non-living resources, rather than considering single issues in isolation. This system of management considers human activities, their benefits, and their potential impacts with the context of the broader biological and physical environment. Instead of developing a management plan for one issue (such as a commercial fishery or an individual source of pollution) ecosystem-based management focuses on the multiple activities occurring within specific areas that are defined by ecosystem, rather than political, boundaries.”

The approach put forth by the Commission is entirely consistent with the policies and purposes of the National Marine Sanctuaries Act (NMSA). The National Marine Sanctuaries Act (NMSA) provides authority to the National Marine Sanctuaries “for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner which complements existing regulatory authorities...” The NMSA directs the Sanctuary to “maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes;...”, as well as, “create models of, and incentives for, ways to conserve and manage these areas, including the application of innovative management techniques;...”, while at the same time “facilitating uses to the extent compatible with the primary purpose of resource protection...”

This action plan strives to adopt this approach by detailing a series of actions that will lay the foundation for effective ecosystem-based management.

Description of the Issues

The public comment scoping process conducted by SBNMS in 1998, and again in 2002, identified several concerns relative to need for comprehensive ecosystem protection and conservation of biological diversity at the SBNMS. Issues raised during public scoping were summarized as follows:

- 1.C Need for comprehensive ecosystem protection
 - 1.C.1. Zoning in the SBNMS including no-take zones
 - 1.C.2 Ecosystem-based management practices
 - 1.C.3 Boundary Modification

This action plan addresses these public issues comprehensively.

Issue Statement

Ecosystem-based management (EBM) arose in the late 20th century to address the pervasive scientific uncertainty inherent in natural systems and the failures of single species management approaches to adequately address that uncertainty. The concept of an ecosystem, on which any

discussion of ecosystem-based management depends, can be defined as a biological community together with its associated physical environment. In the context of the marine environment, this would include all marine organisms including humans as well as the physical properties of the water column and the seafloor.

As the Sanctuary is not an ecosystem unto itself but rather part of the much larger Gulf of Maine ecosystem, the application of EBM to the SBNMS can be approached along two parallel tracks. First, the application of EBM at the SBNMS will involve the intensive collaboration with other regional agencies charged with managing components of the ecosystem beyond the Sanctuary boundaries. Second, for management within the Sanctuary boundaries, the guiding principles of EBM can be used in an ecosystem-based management approach where an obvious sub-set of the larger Gulf of Maine ecosystem is being managed.

There are no comprehensive EBM plans in the southern Gulf of Maine at this time. The SBNMS currently regulates the mining of sand and gravel, disturbance of the seafloor (with the exception of fishing activity), and dumping of waste material within its boundaries. Fisheries management in the Federal waters of the region is conducted on a species by species basis. Similarly, though the Atlantic Large Whale Take Reduction Team has grouped a number of large cetaceans under its auspices, the Marine Mammal Protection Act is also enforced on a species by species basis.

Goal

The ecosystem-based management working group considered the many definitions of ecosystem-based management within the context of the sanctuary's situation and came to consensus on the following definition and goal:

Ecosystem-based sanctuary management (EBSM) integrates knowledge of ecological interrelationships [with existing societal values] to manage impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary while recognizing that the sanctuary is nested within Gulf of Maine large marine ecosystem. Effective implementation of EBSM should: (1) consider ecological processes that operate both inside and outside sanctuary boundaries, (2) recognize the importance of species and habitat diversity, and (3) accommodate human uses and associated benefits within the context of conservation requirements.

Objectives

The objectives of this plan are to:

- Comply with the purposes and policies of the National Marine Sanctuaries Act
- Understand ecosystem structure and function
- Recognize the interconnectedness with larger ecosystem
- Recognize our uncertainty of how systems function
- Manage adaptively
- Maintain public accessibility to SBNMS
- Achieve environmental sustainability of sanctuary resources

- Maintain and enhance biological diversity and ecological integrity
- Reduce habitat impacts by users
- Establish a process for creating a zoning scheme

Addressing the Issues – Strategies For This Action Plan

The ecosystem-based management working group developed the following research and management strategies to begin implementing EBM and establishing the infrastructure and framework for its continued development. Measures to evaluate the performance of strategies and their associated activities are listed at the end of each strategy/activity group.

STRATEGY EBM.1- ESTABLISH A RESEARCH STEERING COMMITTEE

The committee should be a working group of the Sanctuary Advisory Council that will assist in developing a research and monitoring plan for the SBNMS, recommending parameters for monitoring that are easily measurable and can serve as biological reference points, and developing an operational and quantifiable definition of ecological integrity. Membership should be comprised of members from SBNMS staff, NEFMC staff, NEFSC staff, academia, fishing industry, and conservation organizations.

Activities designated for this strategy include:

Establish steering committee. The Sanctuary Advisory Council must establish the steering committee as a working group so that outside members can participate.

Status: Completed by year 1.

Potential partners: researchers, managers

Strategy Performance measure: Research steering committee is established by SAC within 1 year.

STRATEGY EBM.2- ESTABLISH A COLLABORATIVE RESEARCH CONSORTIUM

The consortium shall be composed of academic, government, fishermen, and private interests who seek to understand how the sanctuary functions. The consortium is a more informal body than the steering committee and its purpose is to further the knowledge of the sanctuary system by fostering collaborative research between users and researchers on topics such as marine mammal acoustics, prey dynamics, oceanography, water quality changes, fish movement, etc.

Activities designated for this strategy include:

Convene sanctuary science symposium. The science coordinator shall organize a symposium on sanctuary science for the purpose of laying the foundation for a consortium and identifying the high priority issues that need to be investigated. This may become a biannual symposium the objective of which is to share knowledge with the SAC, Sanctuary Staff and other interested parties.

Status: Completed by year 1.

Potential partners: researchers, managers, academia, public

Initiate consortium. The science coordinator shall initiate the consortium through email/listserve and a website specifically designed to foster the sharing of ideas and posting of results.

Status: Completed by year 2.

Potential partners: researchers, managers, academia, public

STRATEGY EBM.3- ESTABLISH AN INFORMATION MANAGEMENT PROGRAM

Using SBNMS' existing infrastructure capacity with outside software expertise, the sanctuary will develop a system with which to integrate, process, synthesize, and analyze scientific data. To maximize the utility of such a system, the user should be able to connect across the system for individual querying of all available data sets. The system will be made available for practical application on both an intuitive and expert level.

The objective of this system is to develop a well-designed information management and dissemination tool to facilitate science-based management. The system is designed to be widely applicable and accessible to SBNMS staff, scientists, decisionmakers, and the public. By setting up a database on an in-house server, SBNMS can expand the range and uses of existing data. Additionally, any user will be able to bring in a database, upload it into the sanctuary's system, and carry out any type of data analysis or processing from statistical analysis to support for management decisions.

Activities designated for this strategy include:

3a. Establish Quality Assurance/Quality Control program. This program will ensure the integrity and quality of the data from the moment it is collected to the point at which it is archived.

Status: Completed by year 1.

Potential partners: internal

3b. Establish proprietary use policy. This policy will accord researchers sole rights to the data data for a set time period after data collection to give them the first opportunity to publish. The policy should be modeled after the one used for GLOBEC.

Status: Completed by year 1.

Potential partners: researchers

3c. Establish FTE data manager. A full-time data manager is needed to administer this program.

Status: Completed by year 1.

Potential partners: internal

3d. Design an information management system. An information management system shall be designed that meets specified requirements related to data input, data access by various users, metadata, analysis, etc.

Status: Completed by year 1.

Potential partners: contractors, researchers, educators

3f. Implement an information management system. The information management system will be implemented first for internal use by SBNMS staff and then for access by the public.

Status: Completed by year 1.

Potential partners: contractors

3e. Process existing data. Databases maintained by the SBNMS or that SBNMS has access to will be processed and made available for analysis.

Status: Completed by year 2.

Potential partners: research steering committee

3g. Design and implement a web portal for public access to databases. The sanctuary has an obligation to make the data it collects or pays for accessible to the public within a reasonable timeframe. A web portal shall be designed that enables this access while maintaining the security of the NOAA network.

Status: Completed by year 3.

Potential partners: researchers, managers, academia, educators, public

Strategy Performance measure: Information management system with public access shall be operational within 3 years.

STRATEGY EBM.4- UNDERSTAND ECOSYSTEM STRUCTURE AND FUNCTION.

Ecosystem structure refers to how the components of an ecosystem are arranged, both horizontally and vertically. Ecosystem function refers to the processes that structure the ecosystem such as predation, succession, reproduction, and competition. The purpose of this strategy is to understand what components make up the sanctuary ecosystem and what processes influence the arrangement of the components.

Activities designated for this strategy include:

4a Develop an operational definition of ecological integrity. Ecological integrity is a term that is location and scale dependent. It is both an intuitive and a technical term. While ecological integrity has not yet been defined by for the SBNMS various definitions point to the notion of maintaining the wholeness of an ecosystem, or portion thereof, such that the system's native diversity and functioning are likely to persist. The objective of this activity is to develop an operational definition of ecological integrity that can be evaluated and monitored over time.

Status: draft operational definition and metrics for measuring ecological integrity by year 1.

Potential partners: research steering committee, consortium, fishermen, other users

4b. Develop appropriate measures of diversity and those processes that mediate patterns of diversity. There are various ways to measure biological diversity and the processes that contribute to it. This activity is aimed at evaluating various measures and determining which ones most appropriately reveal the effectiveness of management actions.

Status: Completed by year 1.

Potential partners: research steering committee, academia, consortium

4c. Establish a long-term monitoring program. This program shall discern changes in both the natural and social systems of the sanctuary. This program shall develop a comprehensive understanding of changes in ecosystem status, and monitoring of socioeconomic dynamics related to management actions. One objective of this monitoring program shall be to determine the efficacy of any zones that are implemented in the sanctuary.

Status: Initiated by year 2.

Potential partners: research steering committee, consortium, fishermen, other users

4d. Establish a directed research program. This program shall complement the monitoring program by investigating ecological processes that explain the patterns identified from monitoring. The research steering committee should advise on the questions to be answered.

Status: Initiated by year 2.

Potential partners: research steering committee, consortium, fishermen, other users

4e. Establish collaborative research programs with the recreational and commercial fishing industries. Examples would include the Northeast Consortium and the Massachusetts Fishermen's Partnership's Fishermen's Initiative for Scientific Habitat and Ecosystem Research (FISHER) within the SBNMS.

Status: Initiated by year 2.

Potential partners: MFP, Northeast Consortium, regional NGO's, NEFMC/CRPI, universities

4f. Develop a dynamic ecosystem model linking patterns of diversity with ecological processes. An initial product of this effort will be a static conceptual model showing functional relationships between species. The research steering committee will then review the model and make recommendations to SBNMS.

Status: Initiated by year 2.

Potential partners: research steering committee, academia, contractors

4g. Classify and map benthic habitats. The SBNMS currently has high resolution multibeam imagery of the entire SBNMS. However, benthic habitats have not been classified or mapped based on the multibeam data and groundtruthing data (e.g. video, sediment sampling and other means). These data would greatly facilitate planning and resource management efforts.

Status: Completed by year 4.

Potential partners: USGS, academia, consortium, MFP

4h. Understand movements of organisms over landscape features. Understand movements of organisms relative to sanctuary seascapes and movement between the sanctuary and surrounding waters. Complete ongoing research, including cooperative research, to tag and track Atlantic cod and expand the research to include other species.

Status: Ongoing.

Potential partners: contractors, academia, consortium, MFP, fishermen

4i. Understand effect of natural disturbance (e.g. storm and tidal events, predation) on seafloor habitats.

Status: Ongoing.

Potential partners: contractors, academia, consortium, MFP, fishermen

4j. Develop predictive larval recruitment, dispersal, and connectivity models. Models shall include sources, sinks, larval concentrations, and larval behaviors using data from various sources.

Status: Initiated by year 2.

Potential partners: Academia, state and federal agencies

4k. Develop an internal oceanographic circulation model. This model will interface with other models and will tie together local, regional, and larger-scale patterns. Development of this model is essential to understand and predict egg and larval transport, and the fate and effect of nutrients and pollutants.

Status: Completed by year 3.

Potential partners: Academia, GoMOOS

4l. Quantify pollutant loadings. The importance of natural and anthropogenic nutrient and other pollutant loadings to sanctuary waters, flora, and fauna from local, subregional (Mass Bay), regional (Gulf of Maine), and global sources shall be quantified.

Status: Completed by year 5.

Potential partners: Academia, MWRA, USGS

4m. Establish an integrated ocean observing system. This system shall collect real-time data at multiple depths on oceanographic and biological parameters identified to aid in ecosystem based management. The system could be a subset of the Gulf of Maine Ocean Observing System and would be implemented with a combination of surface buoys and seafloor sensors.

Status: Completed by year 5.

Potential partners: GoMOOS, academia, fishermen, shippers

Strategy performance measures:

1. Trend analysis of suite of indicator species shall be analyzed by year 3 and completed thereafter on an annual basis.
2. Nutrient loadings in the sanctuary from local and farfield sources shall be quantified by year 5.
3. The dispersal rate and trajectories of model larvae under various environmental conditions shall be quantified by year 3.
4. The movement rates and distances of cod and redfish over gravel and boulder habitats during all seasons shall be quantified by year 4.
5. Real-time oceanographic and meteorological data shall be provided via the web for at least two locations within the SBNMS by year 5.
6. Benthic habitats in the entire sanctuary shall be mapped at a scale of 1:60,000 or better by year 5.

STRATEGY EBM.5- PROTECT ECOLOGICAL INTEGRITY

The primary goal of EBM is to protect the ecological integrity of the sanctuary. No one action is sufficient to protect the integrity of the system short of making the sanctuary a wilderness area. The purpose of this strategy is to implement a set of complementary actions that will ensure the integrity of the ecosystem.

5a. Establish a zoning working group to evaluate the adequacy of existing zoning schemes in SBNMS to meet the goals of ecosystem based sanctuary management and if needed, develop a modified zoning scheme (including a consideration of fully protected reserves) to meet those goals. If modifications are needed, the overlap between the sanctuary and the WGOM closure should be evaluated as an option for a protection zone and the potential for a reserve.

The zoning working group shall develop metrics for zone performance based on the objectives of the various zones. These metrics shall form the foundation of a monitoring program designed to determine the efficacy of the zoning scheme.

The zoning scheme shall be recommended to the SBNMS by a zoning working group within two years of the implementation of the final management plan as defined by the publication date for the Federal Register Notice notifying the public of the availability of the final management plan. The zoning working group shall be established by the SAC at its November 2004 meeting for the purpose of reviewing and evaluating data and information as it becomes available through various venues (eg. Omnibus Essential Fish Habitat process, sanctuary efforts) and making a recommendation to the SAC and ultimately to the sanctuary superintendent. The membership of the zoning working group shall be of representative stakeholder groups similar to the ecosystem-based management working group. The zoning working group shall begin meeting in January 2005 in order to efficiently utilize the time that the final management plan is in preparation.

Status: Completed by year 2.

Potential partners: representative stakeholders

5b. Develop a zone monitoring plan. The research steering committee in cooperation with the sanctuary science coordinator shall design a monitoring program that determines the efficacy of the zoning scheme for enhancing and maintaining ecological integrity. The zone monitoring program shall be implemented prior to and for at least 10 years after the implementation of the zoning scheme.

Status: Completed by year 2.

Potential partners: stakeholders (users and non-users)

5c. Implement a permanent ban on the exploitation of sand eels (*Ammodytes spp.*). Sand eels are an important forage species in the sanctuary and are currently unexploited. Sand eels are an important forage species for baleen whales, groundfish, and pelagic fish and are an important component of the food web of the SBNMS. In the past there has been a small-scale bait fishery for sand eels in the Massachusetts Bay area and there is currently a sand eel fishery in the North Sea. This activity will be implemented by the NEFMC at the request of the SBNMS and New England states would be requested to implement the same ban on possession and landings.

Status: Completed by year 1.

Potential partners: NEFMC

5d. Assess and minimize bycatch and discard. Bycatch of target and non-target species shall be minimized in the SBNMS. This activity could be implemented by the NEFMC.

Status: Completed by year 3.

Potential partners: NEFMC

5e. Require vessel monitoring systems (VMS). VMS shall be required for all recreational for-hire and commercial fishing vessels in the sanctuary. This requirement is necessary in order to fully understand the level of exploitation in the sanctuary, the socioeconomic impacts of regulations, the spatial distribution of effort, and the effort adjacent to closed areas. This activity will be implemented by the NEFMC.

Status: Completed by year 2.

Potential partners: stakeholders (users and non-users)

5f. Require automated identification systems (AIS). AIS shall be required for all vessels not involved in commercial fishing or recreational for-hire fishing. This requirement is necessary in order to fully understand the spatial distribution of uses, the socioeconomic impact of regulations, and the activity in and around closed areas. This activity will be implemented by the US Coast Guard.

Status: Completed by year 3.

Potential partners: US Coast Guard

Strategy performance measures:

1. A zone monitoring plan shall be implemented within 2 years of final management plan implementation and zone monitoring results (pre-zoning scheme) shall be available within 4 years.
2. All commercial and recreational vessels using the SBNMS shall have a vessel monitoring system or automatic identification system within 2 years.
3. At-sea observers to measure bycatch rates and discards of target and non-target species shall be used on 20% of sanctuary fishing vessels of all types within 2 years.

EBM 6. - EVALUATE THE NEED AND FEASIBILITY FOR EXPANDING THE SANCTUARY BOUNDARY.

This strategy is intended to evaluate the need for and feasibility of expanding the SBNMS boundary to include more of Jeffrey's Ledge. The reason for this is that herring on Jeffrey's Ledge may act as a "buffer" prey for predator species in times of low sand eel abundance on Stellwagen Bank. If results indicate that expansion is warranted, action should be taken by the SAC and the SBNMS to expand the sanctuary boundaries to include more of Jeffrey's Ledge.

Status: Completed by year 5.

Potential partners:

Strategy performance measures:

1. Understand the relationship of herring on Jeffrey's Ledge with humpback whales in the SBNMS by year 5.
2. Characterize the ecology and socioeconomics of Jeffrey's Ledge by year 5.

EBM 7. - IMPLEMENT 10-YEAR MORATORIUM ON TRAWLING AND SEINING FOR ATLANTIC AND RIVER HERRING. Request that the NEFMC implement a 10-year moratorium on trawling and seining for herring in the SBNMS in order to discern the effects of the herring fishery on sanctuary resources.

Status: Completed by year 3.

Potential partners: NEFMC

Strategy performance measures:

1. Statistical comparison of trend analysis of herring stocks with and without fishing by year 5.
2. Statistical comparison of predator behavior around fished and unfished herring schools by year 5.

EBM 8. - EVALUATE AND MITIGATE EXTERNAL INFLUENCES ON THE SBNMS. The sanctuary is an open system downstream of much of the Gulf of Maine. It is influenced by activities and processes outside of its border. Many external influences occur on such a broad scale that they are difficult or impossible to mitigate. Nevertheless, sanctuary regulations prohibit the discharge or deposit of any material or other matter that subsequently enters the sanctuary and injures a resource or quality. This strategy is intended to understand the extent of those external influences that can be mitigated or eliminated.

Activities designated for this strategy include:

Assess the extent of invasive species. The sanctuary is an open system and is vulnerable to invasion by exotic species. The presence or absence and extent of invasive species is currently unknown. If invasive species exist the threats they pose must be evaluated.

Status: Completed by year 5.

Potential partners: EPA, volunteer divers, academia

Eliminate ballast water exchange. Discharges of ballast water in the Sanctuary is a source of invasive species and must be curtailed.

Status: Completed by year 2.

Potential partners: EPA, shipping industry

Enforce existing watershed protection measures. Fully enforce the Clean Air and Clean Water acts to reduce watershed inputs to the sanctuary. Implement watershed management to minimize turbidity and diminish coastal runoff, including, but not limited to, nutrient plumes from rivers. Such management strategies may include, for example, requiring forested easements along all watersheds.

Status: Completed by year 2.

Potential partners: EPA, state coastal management programs,

Implement speed restrictions. Vessels traversing the sanctuary should be limited to 13 knots (the mortality threshold for ship-whale collisions).

Status: Completed by year 4.

Potential partners: NMFS, SAC, shipping industry

Mitigate impacts from pipelines, cables, and conduits. Any use or crossing of the sanctuary for cables, pipelines, or conduits must be subject to review and assessed for costs to cover continuing impact monitoring for the lifetime of the easement.

Status: Completed by year 1.

Potential partners: SAC, NMSP

Strategy performance measures:

1. Enumerate invasive species and map their extent by year 5.
2. Eliminate ballast water discharges by year 3.
3. Reduce vessel speed to 13 knots by year 4.